

NON-PUBLIC?: N
ACCESSION #: 9305180308
LICENSEE EVENT REPORT (LER)

FACILITY NAME: CRYSTAL RIVER UNIT 3 (CR-3) PAGE: 1 OF 4

DOCKET NUMBER: 05000302

TITLE: Inappropriate Personnel Action Resulted In Degraded Class
1E Bus Voltage and Actuation of Emergency Diesel
Generator
EVENT DATE: 04/08/93 LER #: 93-004-00 REPORT DATE: 05/10/93

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 5 POWER LEVEL: 000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: W. A. Stephenson, Nuclear Safety TELEPHONE: (904) 795-6486
Supervisor

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 8, 1993, Crystal River Unit 3 (CR-3) was in MODE 5 (COLD SHUTDOWN) for a planned maintenance outage. Electrical power was being supplied via backfeed from the 500 kilovolt (KV) switchyard. One of the two Class 1E electrical systems was out of service. At 1803 the 500KV breakers opened, interrupting the power backfeed. The in-service Class 1E 4160 Volt (V) bus deenergized. The "B" Emergency Diesel Generator started automatically and reenergized the bus. This report is submitted in accordance with 10CFR50.73(a)(2)(iv).

Decay heat removal flow was stopped for approximately three minutes during the transition of loads to the Emergency Diesel Generator. Reactor Coolant System temperature, initially 89 degrees Fahrenheit, increased approximately 4.5 degrees Fahrenheit during this period.

The event occurred when personnel followed an incorrect sequence for removing DC power to the 500KV breaker protective relays as a result of inadequate work instructions being used to replace a battery cell in one of the switchyard battery banks. Additional administrative controls have been established to reduce the risk of interruption of offsite power and decay heat removal. Additional corrective actions, based on the results of a Human Performance Enhancement System (HPES) analysis, will be addressed.

END OF ABSTRACT

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EVENT DESCRIPTION

On April 8, 1993, Crystal River Unit 3 (CR-3) was in MODE 5 (COLD SHUTDOWN) for a planned maintenance outage. The reactor AC, RCT! was being cooled by the "B" Decay Heat (DH) Removal BP! system. Reactor Coolant System (RCS) AB! temperature was 89 degrees Fahrenheit (F). RCS pressure was being maintained at 58 pounds per square inch gauge (psig). The startup transformer E, XFMR! and the "A" Engineered Safeguards (ES) electrical busses EB, BU! were out of service due to maintenance and modification activities. The offsite power transformer EB, XFMR! powered from the 230KV switchyard was available as a backup, but not in service. All plant electrical power was supplied via backfeed from the 500 kilovolt (KV) switchyard FK!. Under this arrangement, power was supplied through the main generator output breakers EL, BKR!, stepup (output) transformers EL, XFMR!, and the auxiliary transformer EL, XFMR!.

Power for operating the 500KV switchyard breakers and protective relay FK, RLY! circuits is provided by two battery banks located in the switchyard. Battery voltage is maintained by local battery chargers FK, BYC!. At the time of the event, electrical technicians were preparing to replace an individual cell in one of the switchyard battery banks.

At 1803 technicians opened the battery disconnect switch FK, DISC! to isolate the battery from its load as part of the replacement work. This action caused battery charger output voltage to oscillate, leading to actuation of protective relaying and opening of breakers in the 500KV switchyard, resulting in loss of the power backfeed. The "B" ES bus EB, BU! deenergized when the backfeed was lost. When the "B" ES bus deenergized, the "B" DH Pump BP, P! tripped, resulting in a temporary loss of DH removal flow. Relays which monitor "B" ES 4160 volt (V) bus

voltage sensed the loss of power and initiated the starting sequence for the "B" Emergency Diesel Generator (EDG)EK, DG!. The EDG started and automatically reenergized the bus. Operators then restarted the "B" DH pump and restored decay heat removal. This report is submitted in accordance with 10CFR 50.73(a)(2)(iv).

At 2019, operators aligned the "B" ES busses to the offsite power transformer.

EVENT ANALYSIS

The "B" EDG functioned as designed. The EDG automatically started and reenergized the 4160V "B" ES bus. Operator actions were timely, appropriate and in accordance with plant procedures.

The core was without cooling for approximately three minutes. RCS temperature increased approximately 4.5 degrees F during this period. The core was adequately subcooled at all times.

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CAUSE

The "B" EDG started following loss of the 500KV backfeed, and "B" ES bus voltage. A Human Performance Enhancement System (HPES) root cause analysis is being performed. The apparent cause is personnel action resulting from inadequate work instructions being used to replace a battery cell in the switchyard battery bank.

An incorrect sequence of steps was used during the replacement. The technicians intended to isolate the battery and allow the charger to power the DC bus. To properly secure switchyard DC power, technicians should have first deenergized the battery charger, and then opened the battery disconnect switch. Although these steps were not included in the written work instructions, appropriate day shift workers, including engineering department personnel, were aware of the required action sequence. Work plans called for the job to be performed on the day shift due to the availability of these personnel and their contact with the vendor on technical issues.

Due to miscommunication between shifts, night shift personnel thought that they were supposed to complete the battery cell replacement. Unaware of the required action sequence, technicians opened the battery disconnect switch before deenergizing the charger. Based on their experience with plant battery chargers, night shift technicians believed that this was acceptable.

The switchyard battery chargers and batteries are arranged such that opening the battery disconnect switch causes the chargers to carry the loads. However, due to their design, the switchyard battery chargers are not satisfactory power supplies by themselves. The technicians had experience working with plant battery chargers which are capable of supplying DC loads without the batteries attached to the bus. When technicians opened the battery disconnect switch, lack of output filtering of the switchyard battery charger output imposed an AC signal on the DC busses. The DC busses also experienced a rapid rise in DC voltage. The imposed AC signal caused many DC solid state protective relays to fail, and caused the 500KV breakers to open. This resulted in an interruption of offsite power to the plant.

CORRECTIVE ACTION

The affected relays were tested and the failed relays were repaired or replaced.

Florida Power Corporation has established additional administrative controls on switchyard activities. These controls will reduce the risk of interruptions of offsite power by avoiding any type of work within the switchyard providing power to shutdown cooling. This would not include "foot patrols" but would include vehicular traffic and maintenance, modification, or testing activities. Any exceptions would require approval of senior plant management prior to initiation. Additional corrective actions, based on the results of the HPES evaluation, will be developed.

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PREVIOUS SIMILAR EVENTS

There have been thirteen previous events where either one or both EDGs have automatically started due to a sensed undervoltage condition on the ES busses. This was the second event which resulted from loss of the backfeed from the 500KV switchyard.

ATTACHMENT 1 TO 9305180308 PAGE 1 OF 1

Florida
Power
CORPORATION

CrystaL River Unit 3
Docket No. 50-302

May 10, 1993
3F0593-04

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Licensee Event Report (LER) 93-04

Dear Sir:

Enclosed is Licensee Event Report (LER) 93-04 which is submitted in accordance with 10 CFR 50.73.

Sincerely,

G. L. Boldt
Vice President
Nuclear Production

EEF:mag

Enclosure

xc: Regional Administrator, Region II
Project Manager, NRR
Senior Resident Inspector

A Florida Progress Company

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